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STRUCTURE FILE UPDATES: 5 NOV 2009 HIGHEST RN 1191377-97-5  
 DICTIONARY FILE UPDATES: 5 NOV 2009 HIGHEST RN 1191377-97-5

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TSCA INFORMATION NOW CURRENT THROUGH June 26, 2009.

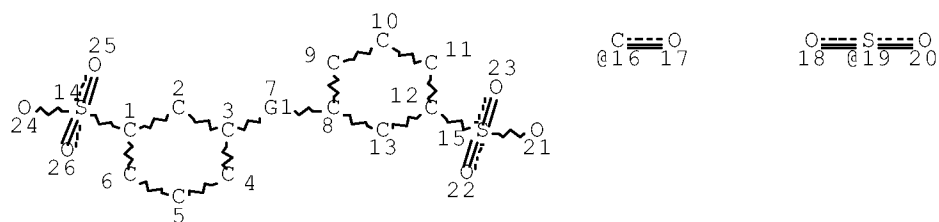
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<http://www.cas.org/support/stngen/stdoc/properties.html>

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L3 STR



VAR G1=16/19

NODE ATTRIBUTES:

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DEFAULT ECLEVEL IS LIMITED

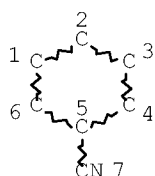
GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 26

STEREO ATTRIBUTES: NONE

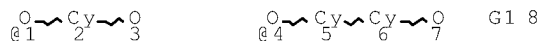
L5 STR



NODE ATTRIBUTES:  
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 DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:  
 RSPEC I  
 NUMBER OF NODES IS 7

STEREO ATTRIBUTES: NONE  
 L7 STR



VAR G1=1/4  
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 DEFAULT MLEVEL IS ATOM  
 DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:  
 RING(S) ARE ISOLATED OR EMBEDDED  
 NUMBER OF NODES IS 8

STEREO ATTRIBUTES: NONE

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L18	458	SEA	FILE=REGISTRY	SPE=ON	ABB=ON	PLU=ON 1194-65-6/CRN
L19	269	SEA	FILE=REGISTRY	SPE=ON	ABB=ON	PLU=ON L18 AND L9
L21	2367	SEA	FILE=REGISTRY	SPE=ON	ABB=ON	PLU=ON L13 AND PMS/CI
L22	107	SEA	FILE=HCAPLUS	SPE=ON	ABB=ON	PLU=ON L16
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L27	108	SEA	FILE=HCAPLUS	SPE=ON	ABB=ON	PLU=ON L22 OR L26
L30	43	SEA	FILE=HCAPLUS	SPE=ON	ABB=ON	PLU=ON L27 AND ELECTROLYT E MEMBRAN?
L31	3	SEA	FILE=HCAPLUS	SPE=ON	ABB=ON	PLU=ON L30 AND (1840-2003) /PRY,AY,PY
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L40	10	SEA	FILE=HCAPLUS	SPE=ON	ABB=ON	PLU=ON L39 AND (1840-2003) /PRY,AY,PY
L41	14	SEA	FILE=HCAPLUS	SPE=ON	ABB=ON	PLU=ON L37 OR L40

=> fil hcap  
 FILE 'HCAPLUS' ENTERED AT 08:24:12 ON 06 NOV 2009  
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FILE COVERS 1907 - 6 Nov 2009 VOL 151 ISS 20  
 FILE LAST UPDATED: 5 Nov 2009 (20091105/ED)  
 REVISED CLASS FIELDS (/NCL) LAST RELOADED: Aug 2009  
 USPTO MANUAL OF CLASSIFICATIONS THESAURUS ISSUE DATE: Aug 2009

HCAplus now includes complete International Patent Classification (IPC) reclassification data for the third quarter of 2009.

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<http://www.cas.org/legal/infopolicy.html>

This file contains CAS Registry Numbers for easy and accurate substance identification.

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=> d l41 1-14 ibib ed abs hitstr hitind

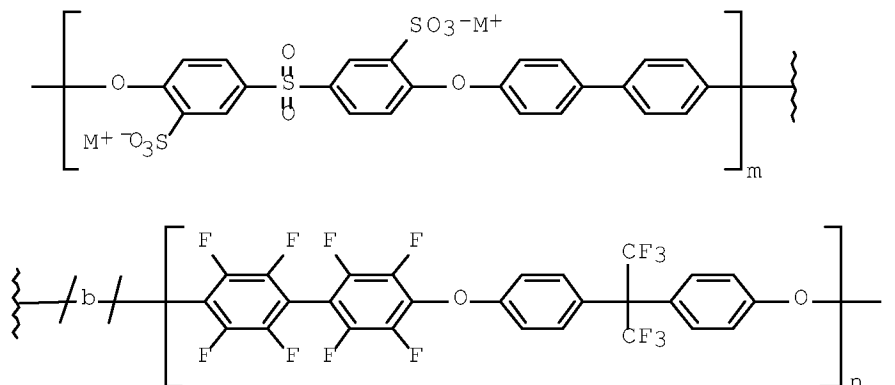
L41 ANSWER 1 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
 ACCESSION NUMBER: 2005:493819 HCAPLUS Full-text  
 DOCUMENT NUMBER: 143:29508  
 TITLE: Multiblock copolymers containing  
 hydrophilic-hydrophobic segments for proton  
 exchange membrane fuel cells  
 INVENTOR(S): Harrison, William; Ghassemi, Hossein; Zawodzinski,  
 Tom A., Jr.; McGrath, James E.  
 PATENT ASSIGNEE(S): Virginia Tech Intellectual Properties, Inc., USA  
 SOURCE: PCT Int. Appl., 25 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2005053060	A2	20050609	WO 2004-US38691	20041119

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WO 2005053060 A3 20051110  
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CA 2545375 A1 20050609 CA 2004-2545375 20041119  
EP 1687377 A2 20060809 EP 2004-816962 20041119  
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK, IS  
JP 2007515513 T 20070614 JP 2006-541369 20041119  
KR 2006115886 A 20061110 KR 2006-710734 20060601  
US 20070292730 A1 20071220 US 2007-595654 20070523  
PRIORITY APPLN. INFO.: US 2003-523332P P 20031120  
WO 2004-US38691 W 20041119

ED Entered STN: 10 Jun 2005  
GI



I

AB Novel multiblock copolymers containing perfluorinated poly(arylene ether) as a hydrophobic segment and disulfonated poly(arylene ether sulfone) as a hydrophilic segment are provided. A multiblock copolymer (I) is disclosed, where M<sup>+</sup> is a pos. charged counterion selected from the group consisting of K,

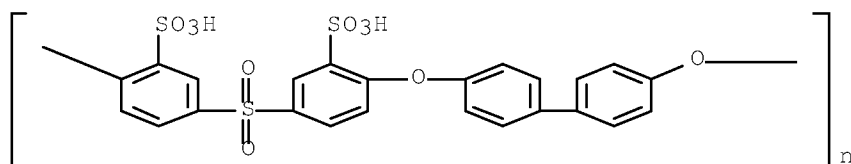
Na, and alkyl amine,  $m = 2-50$ ,  $n = 2-30$ , and  $b$  represents connection of resp. blocks. The multiblock copolymers are used to form proton exchange membranes that are thermally and hydrolytically stable, flexible, and that exhibit low methanol permeability and high proton conductivity. The proton exchange membranes are thus well-suited for use as polymer electrolytes in fuel cells.

IT 701915-80-2F

(multiblock copolymers containing hydrophilic-hydrophobic segments for proton exchange membrane fuel cells)

RN 701915-80-2 HCAPLUS

CN Poly[oxy[1,1'-biphenyl]-4,4'-diyoxy(2-sulfo-1,4-phenylene)sulfonyl(3-sulfo-1,4-phenylene) sodium salt (1:2)] (CA INDEX NAME)



●2 Na

IC ICM H01M

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

IT 136835-79-5P 136875-49-5P 701915-79-9P 701915-80-2F

(multiblock copolymers containing hydrophilic-hydrophobic segments for proton exchange membrane fuel cells)

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 2 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2005:472217 HCAPLUS Full-text

DOCUMENT NUMBER: 143:8209

TITLE: Ion conductive polyether-polyketone-type polymers containing one or more hydrophobic oligomers

INVENTOR(S): Cao, Shuguang; Jeanes, Thomas; Nam, Kie Hyun; Chen, Jian Ping; Olmeijer, David

PATENT ASSIGNEE(S): Polyfuel Inc., USA

SOURCE: PCT Int. Appl., 93 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 6

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005049696	A1	20050602	WO 2004-US37805	20041112

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10/566,218

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GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP,  
KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD,  
SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,  
VC, VN, YU, ZA, ZM, ZW

RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW,  
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GQ, GW, ML, MR, NE, SN, TD, TG

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US 20050282919	A1	20051222	US 2004-988187	20041112
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US 7507771	B2	20090324		
EP 1687357	A1	20060809	EP 2004-810828	20041112
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SG 149827	A1	20090227	SG 2009-230	20041112
MX 2006005345	A	20061129	MX 2006-5345	20060512
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KR 2007017305	A	20070209	KR 2006-711528	20060612
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KR 907759	B1	20090715		
PRIORITY APPLN. INFO.:			US 2003-520266P	P 20031113
			<--	
			US 2004-545293P	P 20040217
			WO 2004-US37805	W 20041112

ED Entered STN: 03 Jun 2005

AB The invention provides proton conductive polyether-polyketone-type polymers comprising (1) a plurality of first oligomers, (2) a plurality of second oligomers, (3) ion conductive monomers and (4) linking monomers. The oligomers preferably are hydrophobic and together with the proton conductive monomers are randomly dispersed between the linking monomers. Uses of such polymeric materials include the formation of polymer electrolyte membranes (PEMs), catalyst coated membranes (CCM's) and membrane electrolyte assemblies (MEA's) which may be used in fuel cells and the like. A typical block copolymer was manufactured by heating DMSO-PhMe mixture containing 4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone 17.6, 42.05:34.91 9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone (I) copolymer (d.p. 4) 15.16, 34.91:40.35 I-bisphenol AF copolymer (d.p. 4) 4.10, 4,4'-biphenol 9.31, and KCO3 8.29 g 6 h at 140° and 4 h at 173-175°.

IT 852455-01-7P,  
2,2'-Biphenol-9,9-bis(4-hydroxyphenyl)fluorene-2,6-difluorobenzonitrile-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer

10/566,218

(proton conductive polyether-polyketone-type polymers containing one or more hydrophobic oligomer blocks for fuel cells)

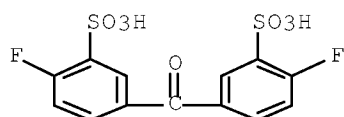
RN 852455-01-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt, polymer with [1,1'-biphenyl]-2,2'-diol, bis(4-fluorophenyl)methanone, 2,6-difluorobenzonitrile and 4,4'-(9H-fluoren-9-ylidene)bis[phenol], block (9CI) (CA INDEX NAME)

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CRN 210531-45-6

CMF C13 H8 F2 O7 S2 . 2 Na

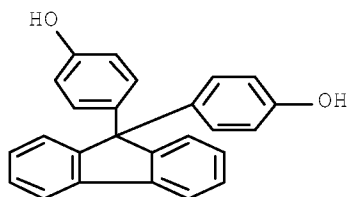


● 2 Na

CM 2

CRN 3236-71-3

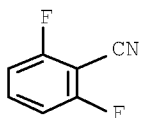
CMF C25 H18 O2



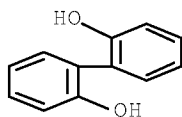
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CRN 1897-52-5

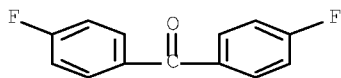
CMF C7 H3 F2 N



CM 4

CRN 1806-29-7  
CMF C12 H10 O2

CM 5

CRN 345-92-6  
CMF C13 H8 F2 O

IC ICM C08G075-00  
ICS C08G075-10; C08F228-00; C08F228-02

CC 35-8 (Chemistry of Synthetic High Polymers)  
Section cross-reference(s): 52

IT 852454-91-2P, 4,4'-Biphenol-bisphenol  
AF-9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer  
852454-92-3P, 4,4'-Biphenol-9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone-4,4'-difluorodiphenyl sulfone-4,4'-thiodiphenol block copolymer  
852454-93-4P, 4,4'-Biphenol-9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852454-94-5P, Bisphenol  
AF-9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer  
852454-95-6P, 4,4'-Biphenol-bisphenol  
AF-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852454-96-7P, Bisphenol  
AF-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852454-97-8DP,  
4,4'-Difluorodiphenyl sulfone-4,4'-thiobisbenzenethiol block copolymer, sulfonated 852454-98-9P,  
1,1-Bis(4-hydroxyphenyl)cyclohexane-9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852454-99-0P,  
2,2'-Biphenol-9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852455-01-7P,  
2,2'-Biphenol-9,9-bis(4-hydroxyphenyl)fluorene-2,6-difluorobenzonitrile-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852455-02-8P,



Bis(4-hydroxyphenyl)-1,4-diisopropylbenzene-9,9-bis(4-hydroxyphenyl)fluorene-2,6-difluorobenzonitrile-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852455-03-9P, 4,4'-Cyclohexylidenebisphenol-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852455-04-0P, Bisphenol AF-4,4'-cyclohexylidenebisphenol-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852455-05-1P, 4,4'-Biphenol-4,4'-cyclohexylidenebisphenol-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852455-10-8P, Bis(4-hydroxyphenyl)-1,4-diisopropylbenzene-9,9-bis(4-hydroxyphenyl)fluorene-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone block copolymer 852455-16-4P, Bisphenol AF-4,4'-difluorobenzophenone-4,4'-difluoro-3,3'-bis(sodiosulfo)benzophenone-4,4'-(1,4-phenylenediisopropylidene)bisphenol block copolymer (proton conductive polyether-polyketone-type polymers containing one or more hydrophobic oligomer blocks for fuel cells)

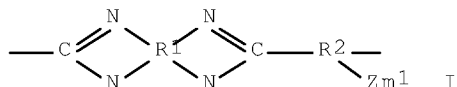
OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 3 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
 ACCESSION NUMBER: 2005:471208 HCAPLUS Full-text  
 DOCUMENT NUMBER: 143:8875  
 TITLE: Acidic group-containing polybenzimidazole compositions and their application  
 INVENTOR(S): Sakaguchi, Yoshimitsu; Kitamura, Kota  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 27 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005139318	A	20050602	JP 2003-377857	20031107
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JP 4337038	B2	20090930		
PRIORITY APPLN. INFO.:			JP 2003-377857	20031107
			<--	

ED Entered STN: 03 Jun 2005  
 GI



AB The compns. contain polybenzimidazoles having structural units I (m1 = 1-4; R1 = imidazole ring-forming tetravalent aromatic bonding unit; R2 = divalent

aromatic bonding unit; Z = sulfonic acid residue, phosphonic acid residue) and poly(arylene ethers) having structural units of  $C_6H_3(SO_3X)-p-YC_6H_3(SO_3X)-p-OArO$  (both  $SO_3X$  are in m-position to Y; Ar = divalent aromatic; Y =  $SO_2$ , CO; X = H, monovalent cation) and  $C_6H_3(o-CN)OAr'O$  (Ar' = divalent aromatic). Ion-conductive membranes containing the compns., their composites with electrodes, fuel cells using the composites and preferably a MeOH fuel, water electrolysis apparatus using the composites, adhesives containing the compns., and manufacture of the ion-conductive membranes by casting step and drying step are also claimed. Thus, a solution containing 2,5-dicarboxybenzenesulfonic acid monosodium salt-3,3',4,4'-tetraaminodiphenylsulfone copolymer and 4,4'-biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer was cast to give a film, which was processed to give a membrane showing ion conductivity 0.034 S/cm and MeOH permeability 2.97 mmol/m<sup>2</sup>-s.

IT 681035-31-4P 852415-23-7P

(polybenzimidazole- and poly(arylene ether)-containing compns. for ion-conductive membranes in fuel cells and water electrolysis apparatus and adhesives)

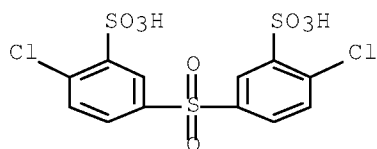
RN 681035-31-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na

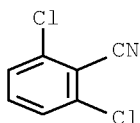


●2 Na

CM 2

CRN 1194-65-6

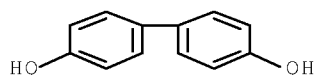
CMF C7 H3 C12 N



CM 3

10/566,218

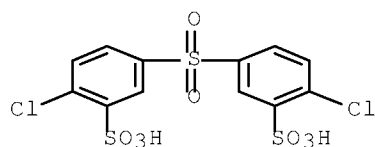
CRN 92-88-6  
CMF C12 H10 O2



RN 852415-23-7 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, polymer with  
[1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (9CI) (CA  
INDEX NAME)

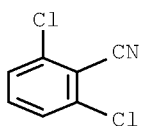
CM 1

CRN 57570-28-2  
CMF C12 H8 Cl2 O8 S3



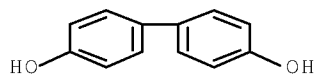
CM 2

CRN 1194-65-6  
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6  
CMF C12 H10 O2



IC ICM C08G073-18  
 ICS C08G065-34; C08J005-22; C09J171-10; C09J179-04; C25B013-08;  
 H01B001-06; H01B013-00; H01M008-02; H01M008-10; C08L079-06  
 CC 38-3 (Plastics Fabrication and Uses)  
 Section cross-reference(s): 52, 72  
 IT 425636-38-0P, 2,5-Dicarboxybenzenesulfonic acid monosodium  
 salt-3,3',4,4'-tetraaminodiphenylsulfone copolymer 426255-33-6P  
 681035-31-4P 852415-23-7P  
 (polybenzimidazole- and poly(arylene ether)-containing compns. for  
 ion-conductive membranes in fuel cells and water electrolysis apparatus  
 and adhesives)

L41 ANSWER 4 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
 ACCESSION NUMBER: 2005:449863 HCAPLUS Full-text  
 DOCUMENT NUMBER: 142:489515  
 TITLE: Solid polymer type electrolytic membrane superior  
 in gas barrier property, workability, dimensional  
 stability, ion conductivity and liquid permeation  
 inhibition for water electrolysis  
 INVENTOR(S): Yamashita, Masahiro; Takase, Satoshi; Sakaguchi,  
 Yoshimitsu; Kitamura, Kota  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

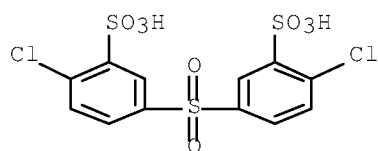
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005133146	A	20050526	JP 2003-370160	20031030
			<--	
PRIORITY APPLN. INFO.:			JP 2003-370160	20031030
			<--	

ED Entered STN: 27 May 2005  
 AB The solid polymer type ion exchange membrane for water anal. contains  
 polyarylene ether compound and has O<sub>2</sub> permeability of 0.1x10<sup>-12</sup>-3x10<sup>-12</sup>  
 mol/cm.s.  
 IT 681035-31-4P 681035-37-0P  
 (solid polymer type electrolytic membrane superior in gas barrier  
 property, workability, dimensional stability, ion conductivity and liquid  
 permeation inhibition for water electrolysis)  
 RN 681035-31-4 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2),  
 polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile  
 (CA INDEX NAME)

CM 1

CRN 51698-33-0  
 CMF C12 H8 C12 O8 S3 . 2 Na

10/566,218

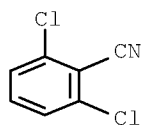


●2 Na

CM 2

CRN 1194-65-6

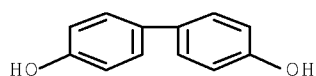
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



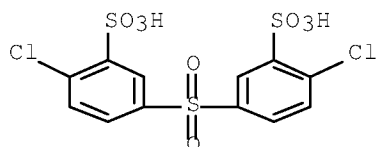
RN 681035-37-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with [1,1'-biphenyl]-4,4'-diol and 2,4-difluorobenzonitrile (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

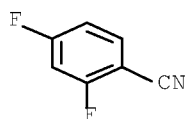


●2 Na

CM 2

CRN 3939-09-1

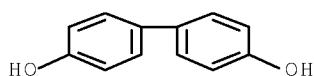
CMF C7 H3 F2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM C25B013-08  
ICS C08G065-40; C25B009-10; H01B001-06  
CC 72-9 (Electrochemistry)  
Section cross-reference(s): 38  
IT 681035-31-4P 681035-36-9P 681035-37-0P  
(solid polymer type electrolytic membrane superior in gas barrier  
property, workability, dimensional stability, ion conductivity and liquid  
permeation inhibition for water electrolysis)  
OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS  
RECORD (1 CITINGS)

L41 ANSWER 5 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
ACCESSION NUMBER: 2005:325738 HCAPLUS Full-text  
DOCUMENT NUMBER: 142:393180  
TITLE: Water-resistant sulfonated arylene polymers useful  
as solid polyelectrolytes for proton conductive  
membranes  
INVENTOR(S): Yamakawa, Yoshitaka; Higami, Makoto; Kadota,

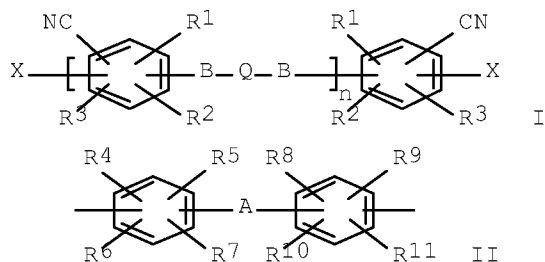
Toshiaki  
 PATENT ASSIGNEE(S): JSR Corporation, Japan  
 SOURCE: U.S. Pat. Appl. Publ., 28 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20050080220	A1	20050414	US 2004-958622	20041006
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US 7115699	B2	20061003		
JP 2005133081	A	20050526	JP 2004-284691	20040929
			<--	
CA 2484250	A1	20050407	CA 2004-2484250	20041006
			<--	
CA 2484250	C	20081202		
KR 2005033823	A	20050413	KR 2004-79353	20041006
			<--	
EP 1524288	A2	20050420	EP 2004-23806	20041006
			<--	
EP 1524288	A3	20050601		
EP 1524288	B1	20080423		

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,  
 PL, SK, HR

PRIORITY APPLN. INFO.: JP 2003-348524 A 20031007  
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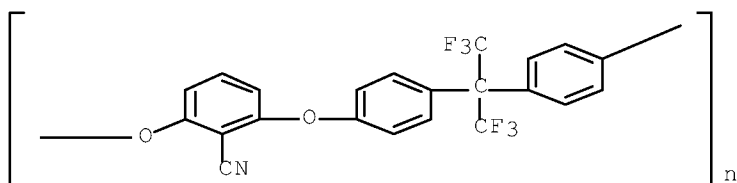
ED Entered STN: 15 Apr 2005  
 GI



AB The invention relates to a compound represented by the general formula I and a polyarylene polymer comprising units derived from the compound of the formula I and units derived from a sulfonated arylene compound. In the formula I, B is independently an oxygen or a sulfur atom; X is an atom or a group selected from halogen atoms other than fluorine, -OSO<sub>2</sub>CH<sub>3</sub> and -OSO<sub>2</sub>CF<sub>3</sub>; R<sub>1</sub> to R<sub>3</sub> may be the same or different and are selected from a hydrogen atom, a fluorine atom, a nitrile group and an alkyl group; n is an integer  $\geq 2$ ; and Q is a structure represented by the formula II, where A is independently a divalent atom or organic group or a direct bond; and R<sub>4</sub> to R<sub>11</sub> may be the same or different and

are selected from a hydrogen atom, a fluorine atom, an alkyl group, and an aromatic group. The sulfonated polymers of the invention have excellent resistance to hot water even if an increased amount of the sulfonic groups was introduced. The sulfonated polymers can be used as solid polyelectrolytes having high proton conductivity and excellent generating performance. Thus, 2,6-dichlorobenzonitrile (48.8 g, 284 mmol), of 2,2-bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane (89.5 g, 266 mmol), and potassium carbonate (47.8 g, 346 mmol) were stirred and refluxed at 150° for 3 h in sulfolane (346) and toluene (173 mL) under nitrogen with removal of water, followed by removing toluene, slowly raising the temperature to 200°, stirring for 3 h, adding 2,6-dichlorobenzonitrile (9.2 g, 53 mmol), and reacting for 5 h. The filtered, methanol-precipitated and dried polymer (109 g) had a number-average mol. weight of 9,500. A sulfonated polymer (122 g, Mw 135,000) was obtained by reacting the above polymer (Mn 9,500, 48.7 g, 5.1 mmol) and neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate (135.2 g, 337 mmol) under nitrogen in the presence of bis(triphenylphosphine)nickel dichloride (6.71 g, 10.3 mmol), sodium iodide (1.54 g, 10.3 mmol), triphenylphosphine (35.9 g, 137 mmol), and zinc (53.7 g, 821 mmol) in N,N-dimethylacetamide (430 mL) at 80° for 3 h, followed by deprotection of the sulfonic acid groups.

IT 193410-37-6P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer, sru  
(water-resistant sulfonated arylene polymers useful as solid polyelectrolytes for proton conductive membranes)  
RN 193410-37-6 HCAPLUS  
CN Poly[oxy(2-cyano-1,3-phenylene)oxy-1,4-phenylene[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]-1,4-phenylene] (CA INDEX NAME)



IC ICM C08G002-00  
INCL 528086000  
CC 37-3 (Plastics Manufacture and Processing)  
Section cross-reference(s): 38, 52  
IT 128116-47-2P, 9,9-Bis(4-hydroxyphenyl)fluorene-2,6-dichlorobenzonitrile copolymer 128147-50-2P 193410-36-5P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer 193410-37-6P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer, sru 849729-09-5P, 9,9-Bis(4-hydroxyphenyl)fluorene-2,2-bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer 849729-11-9P, 4,4'-Biphenol-2,2-bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer  
(water-resistant sulfonated arylene polymers useful as solid polyelectrolytes for proton conductive membranes)  
OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)  
REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT



L41 ANSWER 6 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
 ACCESSION NUMBER: 2005:235276 HCAPLUS Full-text  
 DOCUMENT NUMBER: 142:282889  
 TITLE: Ion exchange membrane composite for fuel cell  
 INVENTOR(S): Yamashita, Masahiro; Takase, Satoshi; Takimoto, Naohiko; Nakamura, Muneatsu; Sasai, Kosuke  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 42 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005068396	A	20050317	JP 2003-410546	20031209
			<--	
PRIORITY APPLN. INFO.:			JP 2003-114628	A 20030418
			<--	
			JP 2003-288193	A 20030806
			<--	

ED Entered STN: 17 Mar 2005

AB The composite has a support membrane having continuous open pores for both sides and an ion exchange resin infiltrated in the support to satisfy ion exchange resin filling ratio in the pores  $\geq 90\%$ . The composite for an electrolyte membrane of a fuel cell has high ion conductivity and prevents liquid fuel permeation.

IT 681035-31-4P

(ion exchanger; ion exchange resin-porous membrane support composite for fuel cell electrolyte)

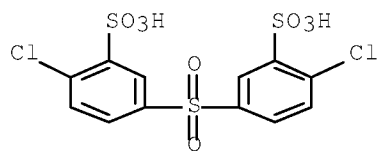
RN 681035-31-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

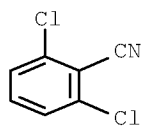


● 2 Na

CM 2

CRN 1194-65-6

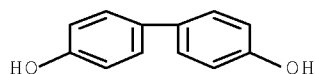
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM C08J005-22  
 ICS B01J039-18; B01J047-12; C08G065-40; H01B001-06; H01M008-02;  
 H01M008-10; C08L079-04  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
 Technology)  
 Section cross-reference(s): 38  
 ST ion exchange resin porous membrane composite fuel cell; fuel cell  
 electrolyte membrane ion exchanger composite  
 IT 681035-31-4P  
 (ion exchanger; ion exchange resin-porous membrane support  
 composite for fuel cell electrolyte)

L41 ANSWER 7 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
 ACCESSION NUMBER: 2005:155740 HCAPLUS Full-text  
 DOCUMENT NUMBER: 142:222644  
 TITLE: Composite ion exchange membranes for fuel cell  
 electrolytes, and their manufacture  
 INVENTOR(S): Hamamoto, Shiro; Nakamura, Muneatsu; Sasai, Kosuke  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 31 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005048022	A	20050224	JP 2003-204724	20030731
			<--	
PRIORITY APPLN. INFO.:			JP 2003-204724	20030731
			<--	

ED Entered STN: 24 Feb 2005

AB The composite membranes comprise polymer membranes, preferably polybenzazole (e.g., polybenzoxazole) membranes, having pores filled with ion exchange resins, where thickness of the porous polymer membranes before filling is 10-60% that after filling. The composite membranes, manufactured by forming isotropic solns. containing 0.3-3% polybenzazoles into membranes and solidifying, show high mech. strength and good gas impermeability.

IT 841303-76-2P

(ion exchanger; manufacture of composite ion exchange membranes comprising porous polymer membranes filled with ion exchange resins for fuel cell electrolytes)

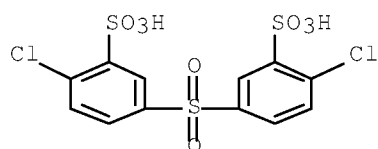
RN 841303-76-2 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with 1,2,3-benzenetricarbonitrile and [1,1'-biphenyl]-4,4'-diol (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

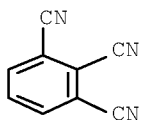


●2 Na

CM 2

CRN 38700-18-4

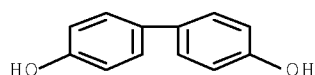
CMF C9 H3 N3



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM C08J005-22  
 ICS H01B001-06; H01B013-00; H01M008-02; H01M008-10; C08L079-04  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
 Technology)  
 Section cross-reference(s): 38, 76  
 IT 841303-76-2P  
 (ion exchanger; manufacture of composite ion exchange membranes  
 comprising porous polymer membranes filled with ion exchange resins  
 for fuel cell electrolytes)

L41 ANSWER 8 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
 ACCESSION NUMBER: 2005:135848 HCAPLUS Full-text  
 DOCUMENT NUMBER: 142:222582  
 TITLE: Tetrafluoroethylene copolymer composite ion  
 exchange membranes showing increased mechanical  
 strength and their manufacture  
 INVENTOR(S): Nagahara, Shigenori; Sakaguchi, Yoshimitsu  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 18 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005044609	A	20050217	JP 2003-202571	20030728
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PRIORITY APPLN. INFO.:			JP 2003-202571	20030728
			<--	

ED Entered STN: 17 Feb 2005  
 AB The composite ion exchange membranes, comprising proton-conductive CF<sub>2</sub>:CF<sub>2</sub>  
 copolymer membranes bonded with sulfonated polyarylene ether membranes, are  
 manufactured by applying N-vinylpyrrolidone or phosphates having ≥1 unsatd.  
 groups on bonding surfaces, laminating, and heating. The composite ion  
 exchange membranes, useful for battery electrolytes, fuel cell electrolytes,  
 etc., show low MeOH permeability.

IT 841303-76-2P  
 (manufacture of composite ion exchange membranes comprising  
 proton-conductive tetrafluoroethylene copolymer membranes and  
 sulfonated polyarylene ether membranes)

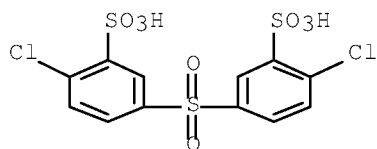
RN 841303-76-2 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
 polymer with 1,2,3-benzenetricarbonitrile and  
 [1,1'-biphenyl]-4,4'-diol (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

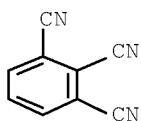


●2 Na

CM 2

CRN 38700-18-4

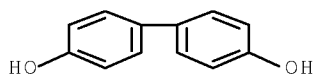
CMF C9 H3 N3



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM H01B001-06  
 ICS C08F214-14; C08F214-26; C08G065-40; H01B013-00; H01M008-02  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
 Technology)  
 Section cross-reference(s): 38, 76  
 IT 841303-76-2P  
 (manufacture of composite ion exchange membranes comprising  
 proton-conductive tetrafluoroethylene copolymer membranes and  
 sulfonated polyarylene ether membranes)

L41 ANSWER 9 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2005:121271 HCAPLUS Full-text

DOCUMENT NUMBER: 142:201622

TITLE: Electrolyte membrane and  
 electrodes for fuel cell assembly

INVENTOR(S): Yamashita, Masahiro; Sakaguchi, Yoshimitsu;  
 Takase, Satoshi; Kitamura, Kota

PATENT ASSIGNEE(S): Toyo Boseki Kabushiki Kaisha, Japan

10/566,218

SOURCE: PCT Int. Appl., 90 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005013399	A1	20050210	WO 2004-JP10807	20040729
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RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
JP 3651682	B2	20050525	JP 2004-39238	20040217
JP 2005232203	A	20050902		
JP 3651683	B2	20050525	JP 2004-50751	20040226
JP 2005243385	A	20050908		
JP 2005243383	A	20050908	JP 2004-50749	20040226
JP 2005243384	A	20050908	JP 2004-50750	20040226
JP 3651684	B2	20050525	JP 2004-53388	20040227
JP 2005243494	A	20050908		
JP 2005243492	A	20050908	JP 2004-53385	20040227
JP 2005243493	A	20050908	JP 2004-53386	20040227
JP 2005063944	A	20050310	JP 2004-171319	20040609
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CN 1833330	A	20060913	CN 2004-80022329	20040729
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US 20080063917	A1	20080313	US 2006-566218	20060127
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PRIORITY APPLN. INFO.:				
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			JP 2004-39238	A 20040217
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			JP 2004-50751	A 20040226
			JP 2004-53385	A 20040227
			JP 2004-53386	A 20040227
			JP 2004-53388	A 20040227
			JP 2003-53388	A 20040227

ED Entered STN: 11 Feb 2005

AB Disclosed is an electrolyte membrane-electrode assembly wherein a hydrocarbon-based solid polymer electrolyte membrane is sandwiched between a pair of electrodes. In this electrolyte membrane-electrode assembly, the glass transition temperature of the electrolyte membrane in a dry state is not less than 160°C and the maximum moisture content of the electrolyte membrane is 10-120%. The electrolyte membrane-electrode assembly is excellent in reliability and durability.

IT 267877-35-0P 681035-31-4P 839469-88-4P  
(preparation of electrolyte membrane and electrodes  
for fuel cell assembly)

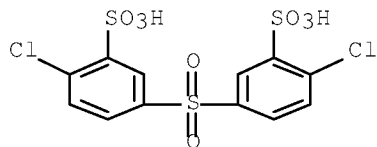
RN 267877-35-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2),  
polymer with [1,1'-biphenyl]-4,4'-diol and  
1,1'-sulfonylbis[4-chlorobenzene] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

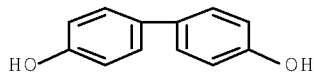


●2 Na

CM 2

CRN 92-88-6

CMF C12 H10 O2

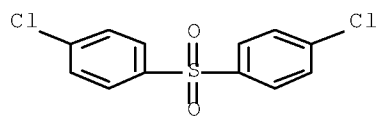


CM 3

CRN 80-07-9

CMF C12 H8 Cl2 O2 S

10/566,218



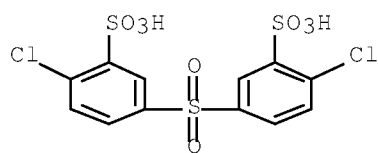
RN 681035-31-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2),  
polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile  
(CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

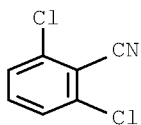


● 2 Na

CM 2

CRN 1194-65-6

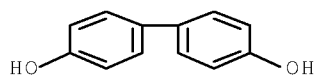
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2





10/566,218

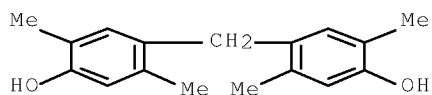
RN 839469-88-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
polymer with [1,1'-biphenyl]-4,4'-diol, bis(4-fluorophenyl)methanone  
and 4,4'-methylenebis[2,5-dimethylphenol] (9CI) (CA INDEX NAME)

CM 1

CRN 111329-41-0

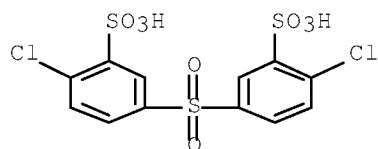
CMF C17 H20 O2



CM 2

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

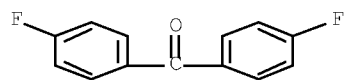


● 2 Na

CM 3

CRN 345-92-6

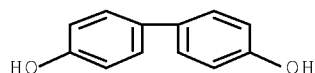
CMF C13 H8 F2 O



CM 4

CRN 92-88-6

CMF C12 H10 O2



IC ICM H01M008-02  
ICS H01M008-10; C08J005-22; C08L071-10; C08G065-40; C08G065-48

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 36

ST **electrolyte membrane** electrode assembly fuel cell  
solid polymer

IT Membranes, nonbiological  
(electrolyte; preparation of **electrolyte membrane**  
and electrodes for fuel cell assembly)

IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-containing; preparation of  
**electrolyte membrane** and electrodes for fuel cell  
assembly)

IT Fuel cells  
Molecular sieves  
Polymer electrolytes  
(preparation of **electrolyte membrane** and electrodes  
for fuel cell assembly)

IT 7440-06-4, Platinum, uses  
(preparation of **electrolyte membrane** and electrodes  
for fuel cell assembly)

IT 7440-44-0, Carbon, uses  
(preparation of **electrolyte membrane** and electrodes  
for fuel cell assembly)

IT 267877-35-0P 681035-31-4P 683774-17-6P  
839469-88-4P  
(preparation of **electrolyte membrane** and electrodes  
for fuel cell assembly)

IT 471-34-1, Calcium carbonate, uses  
(preparation of **electrolyte membrane** and electrodes  
for fuel cell assembly)

OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS  
RECORD (27 CITINGS)

REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN THE  
RE FORMAT

L41 ANSWER 10 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2005:54384 HCAPLUS Full-text

DOCUMENT NUMBER: 142:117697

TITLE: Sulfonated polysulfones showing high ionic  
conductivity, their manufacture, compositions, and  
proton exchange membranes for fuel cells

INVENTOR(S): Kitamura, Kota; Sakaguchi, Yoshimitsu; Yanase,  
Norio; Kojima, Yoshito

PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan; Konishi Kagaku Kogyo Co.,  
Ltd.

SOURCE: Jpn. Kokai Tokkyo Koho, 31 pp.  
CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

## PATENT INFORMATION:

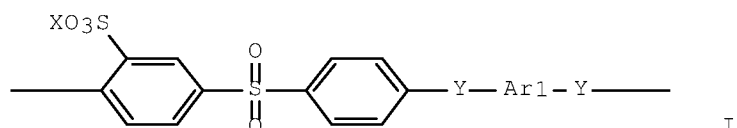
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005015607	A	20050120	JP 2003-181729	20030625

PRIORITY APPLN. INFO.:

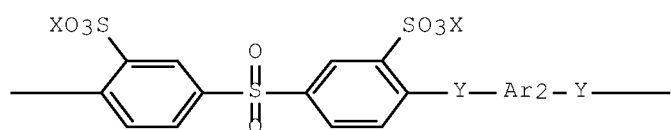
JP 2003-181729	20030625
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ED Entered STN: 20 Jan 2005

GI



I



II

AB The polysulfones, including structural repeating units I (X = H, monovalent cation; Y = O, S; Ar1 = arylene), are manufactured by polymerization of compns. containing II (X = H, monovalent cation; Z = halo, NO2). The polysulfones show high ionic conductivity and low fuel permeability, especially MeOH permeability, resulting in useful for direct methanol fuel cells.

IT 821791-91-7F 821791-92-8F 821791-93-9F

(manufacture of sulfonated polysulfones high ionic conductivity and low fuel

permeability as proton exchange membranes for fuel cells)

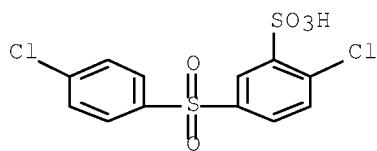
RN 821791-91-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with [1,1'-biphenyl]-4,4'-diol and sodium 2-chloro-5-[(4-chlorophenyl)sulfonyl]benzenesulfonate (9CI) (CA INDEX NAME)

CM 1

CRN 821791-90-6

CMF C12 H8 C12 O5 S2 . Na

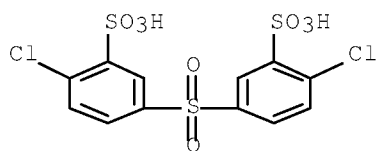


● Na

CM 2

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

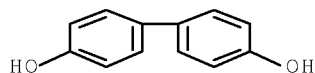


●2 Na

CM 3

CRN 92-88-6

CMF C12 H10 O2



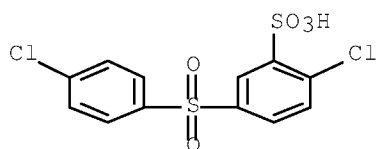
RN 821791-92-8 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
polymer with [1,1'-biphenyl]-4,4'-diol, sodium  
2-chloro-5-[(4-chlorophenyl)sulfonyl]benzenesulfonate and  
1,1'-sulfonylbis[4-chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 821791-90-6

CMF C12 H8 Cl2 O5 S2 . Na



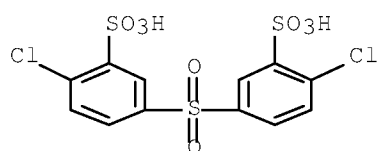
● Na

10/566,218

CM 2

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

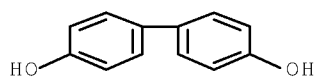


●2 Na

CM 3

CRN 92-88-6

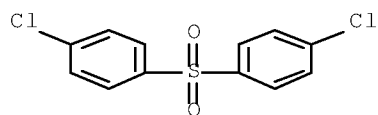
CMF C12 H10 O2



CM 4

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



RN 821791-93-9 HCAPLUS

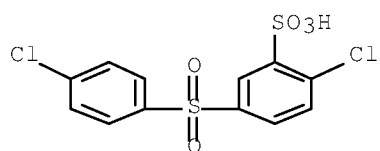
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile and sodium 2-chloro-5-[(4-chlorophenyl)sulfonyl]benzenesulfonate (9CI) (CA INDEX NAME)

CM 1

CRN 821791-90-6

CMF C12 H8 Cl2 O5 S2 . Na

10/566,218

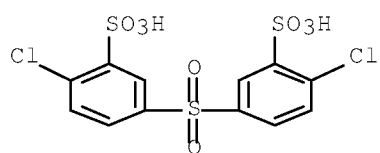


● Na

CM 2

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

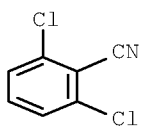


●2 Na

CM 3

CRN 1194-65-6

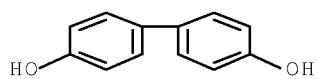
CMF C7 H3 Cl2 N



CM 4

CRN 92-88-6

CMF C12 H10 O2

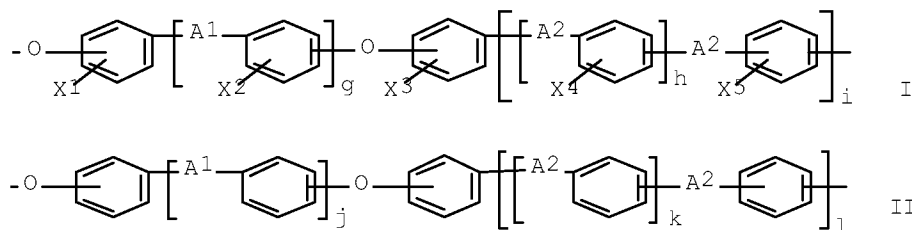


IC ICM C08G065-38  
 ICS C08J005-22; H01B001-06; H01B001-12; H01M008-02; H01M008-10  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
 Technology)  
 Section cross-reference(s): 35, 38  
 IT 821791-91-7P 821791-92-8P 821791-93-9P  
 (manufacture of sulfonated polysulfones high ionic conductivity and low  
 fuel permeability as proton exchange membranes for fuel cells)

L41 ANSWER 11 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN  
 ACCESSION NUMBER: 2004:1128721 HCAPLUS Full-text  
 DOCUMENT NUMBER: 142:77601  
 TITLE: Proton conductive block-copolymers with good water  
 resistance and low moisture absorption and low  
 methanol penetration for proton conductive  
 membranes  
 INVENTOR(S): Ishikawa, Junichi; Omi, Katsuhiko; Fujiyama,  
 Akiko; Toriida, Masahiro; Takeda, Koji; Kuroki,  
 Takashi; Tamai, Masashi  
 PATENT ASSIGNEE(S): Mitsui Chemicals Inc., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004359925	A	20041224	JP 2003-207951	20030819
			<--	
PRIORITY APPLN. INFO.:			JP 2003-102682	A 20030407
			<--	

ED Entered STN: 24 Dec 2004  
 GI



AB Title block copolymers comprise repeating unit blocks I and II, wherein X1, X2, X3, X4, X5 = H or protonic acid group (at least one of them is a protonic acid group); A1, A2, A3, A4 = direct bond, CH2, C(CH3)2, C(CF3)2, O, SO2, or CO; or g, h, i, j, k, l = 0 or 1; hydrogen of the aromatic ring = H, CmH2m+1, Cl, F, CF3, or CN; and m = 1-10 integer. Thus, 42.23 g 3,3'-carbonylbis(sodium 6-fluorobenzenesulfonate) and 25.63 g bis(3-methyl-4-

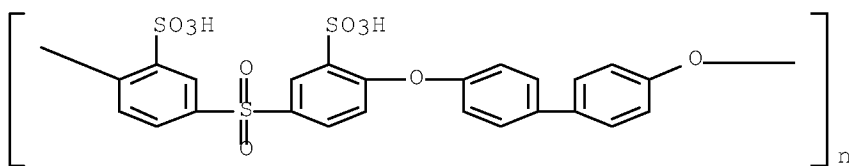
hydroxyphenyl)methane were reacted at 141° for 8 h to give a copolymer with reduced viscosity 0.13 dL/g and glass transition temperature  $\geq 250^\circ$ , 21.82 g 4,4'-difluorobenzophenone and 25.63 g bis(3-methyl-4-hydroxyphenyl)methane were added therein and reacted at 157° for 8 h to give a block copolymer with reduced viscosity 1.21 dL/g and glass transition temperature 220°, 4 g of the resulting block copolymer was dissolved in 36 g DMSO/dimethylacetamide mixture, cast onto a glass substrate, dried at 200°, washed, and proton-exchanged with sulfuric acid to give a proton conductive film with ion exchange capacity 510 g/mol, moisture absorption 12%, ion conductivity 0.14 S/cm, and methanol permeability 0.4  $\mu\text{mol}/\text{cm}^2\cdot\text{minute}$ .

IT 701915-80-2F

(intermediate; preparation of proton conductive block-copolymers with good water resistance, low moisture absorption, and low methanol penetration for proton conductive membranes)

RN 701915-80-2 HCAPLUS

CN Poly[oxy[1,1'-biphenyl]-4,4'-diyloxy(2-sulfo-1,4-phenylene)sulfonyl(3-sulfo-1,4-phenylene) sodium salt (1:2)] (CA INDEX NAME)



●2 Na

IC ICM C08G065-48

ICS C08J005-22; H01M008-02; H01M008-10; C08L071-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

IT 389600-31-1P 701915-80-2F 785802-31-5P 812669-30-0P  
812669-39-9P 812669-44-6P 812669-47-9P 812669-50-4P  
812669-55-9P 812677-79-5P

(intermediate; preparation of proton conductive block-copolymers with good water resistance, low moisture absorption, and low methanol penetration for proton conductive membranes)

OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)

L41 ANSWER 12 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2004:355275 HCAPLUS Full-text

DOCUMENT NUMBER: 140:376230

TITLE: Composite ion exchanger membrane

INVENTOR(S): Kitamura, Kota; Sakaguchi, Yoshimitsu; Nagahara, Shigenori; Hamamoto, Shiro; Takimoto, Naohiko; Sugihara, Hideki; Takase, Satoshi; Kitagawa, Tooru; Saito, Miyako

PATENT ASSIGNEE(S): Toyo Boseki Kabushiki Kaisha, Japan

SOURCE: PCT Int. Appl., 92 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese



FAMILY ACC. NUM. COUNT: 1

## PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2004036679	A1	20040429	WO 2003-JP13278	20031016

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 CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB,  
 GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KR, KZ, LC,  
 LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI,  
 NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL,  
 SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA,  
 ZM, ZW

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ,  
 BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,  
 EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,  
 SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,  
 NE, SN, TD, TG

JP 2004139836	A	20040513	JP 2002-303289	20021017
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JP 2004139837	A	20040513	JP 2002-303290	20021017
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JP 2004143388	A	20040520	JP 2002-312837	20021028
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JP 2004169003	A	20040617	JP 2003-355364	20031015
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AU 2003273034	A1	20040504	AU 2003-273034	20031016
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US 20060241192	A1	20061026	US 2005-530965	20050411
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PRIORITY APPLN. INFO.:			JP 2002-303289	A	20021017
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			JP 2002-312837	A	20021028
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			JP 2002-313025	A	20021028
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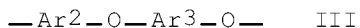
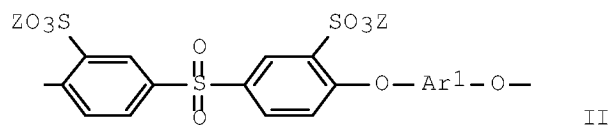
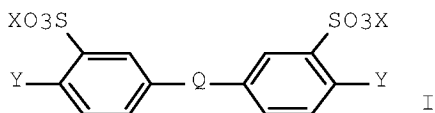
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			WO 2003-JP13278	W	20031016
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ED Entered STN: 30 Apr 2004

GI



AB The membrane has ion exchanger resin in the continuous through holes in a support membrane, where the ion exchanger resin contains an aromatic ether and/or its derivative, formed by polymerization of mixture containing monomers I (Q = -SO<sub>2</sub>- or -CO-, X = H, Li, Na, or K, Y = F, Cl, Br, or I), aromatic dihalides, and bisphenol compound and alkali metal (bi)carbonate. The ion exchange resin contain 0-1000 structural units II (Z = H, Li, Na, K, or cation derived. from aliphatic or aromatic amines; Ar<sub>1</sub> and Ar<sub>3</sub> = bivalent organic groups, Ar<sub>2</sub> = bivalent organic groups containing ≥1 arom ring having electron attracting group) and 0-1000 structural units III. The composite membrane may be used as fuel cell electrolyte.

IT 267877-35-0 681035-31-4

(composite membranes containing ion exchanger resins in porous polymer support membranes for fuel cell electrolytes)

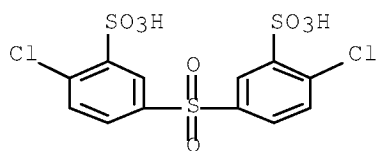
RN 267877-35-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol and 1,1'-sulfonylbis[4-chlorobenzene] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na



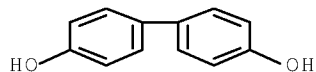
●2 Na

CM 2

CRN 92-88-6

10/566,218

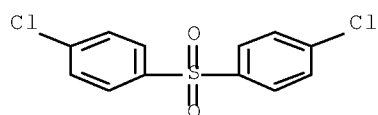
CMF C12 H10 O2



CM 3

CRN 80-07-9

CMF C12 H8 C12 O2 S



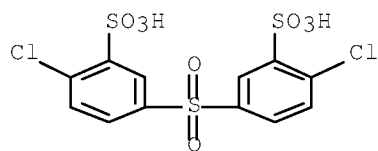
RN 681035-31-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na

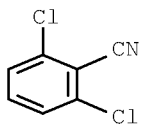


●2 Na

CM 2

CRN 1194-65-6

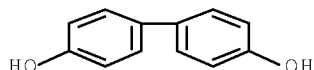
CMF C7 H3 C12 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM H01M008-02

ICS C08J005-22

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 52

IT 75-75-2, Methanesulfonic acid 60871-72-9 146673-89-4  
267877-35-0 681035-31-4

(composite membranes containing ion exchanger resins in porous polymer support membranes for fuel cell electrolytes)

OS.CITING REF COUNT: 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (12 CITINGS)

REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L41 ANSWER 13 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2004:333769 HCAPLUS Full-text

DOCUMENT NUMBER: 140:340474

TITLE: Polyarylene ether compounds containing sulfonic acid groups, their compositions and manufacture method

INVENTOR(S): Sakaguchi, Yoshimitsu; Kitamura, Kota; Nagahara, Shigenori; Yamashita, Masahiro; Nakao, Junko

PATENT ASSIGNEE(S): Toyo Boseki Kabushiki Kaisha, Japan

SOURCE: PCT Int. Appl., 75 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2004033534	A1	20040422	WO 2003-JP12850	20031007

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W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,  
CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB,  
GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KR, KZ, LC,

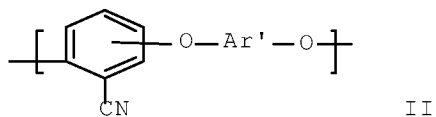
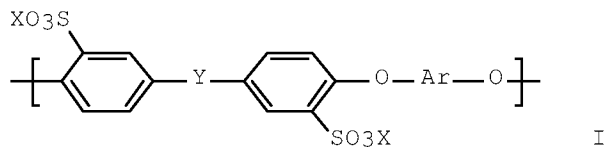
10/566,218

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JP 2004149779	A	20040527	JP 2003-348477	20031007
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JP 3928611	B2	20070613		
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AT 444328	T	20091015	AT 2003-748749	20031007
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JP 4310688	B2	20090812		
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			JP 2003-32621	A 20030210
			<--	
			JP 2003-32622	A 20030210
			<--	
			WO 2003-JP12850	W 20031007
			<--	

ED Entered STN: 23 Apr 2004  
GI



AB The title polymers, showing good ion conductivity and heat resistance, comprise the units of I and II (Ar, Ar' = divalent aromatic group; X = H, monovalent cation; Y = SO<sub>2</sub>, CO). The polymers and their compns. containing polybenzimidazoles are useful for ion-conductive films, electrolytes, fuel cells, and adhesives. Thus, a 1:0.38:0.62 (mol) 4,4'-biphenol-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt-2,6-dichlorobenzonitrile copolymer was prepared and made into a film showing 3%-weight loss temperature 380° and ion conductivity 0.14 S/cm.

IT 681035-31-4P

(heat-resistant sulfo-containing polyethers for ion-conductive films)

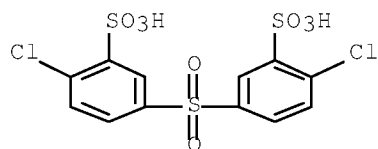
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CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (CA INDEX NAME)

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CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

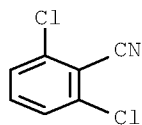


●2 Na

CM 2

CRN 1194-65-6

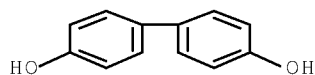
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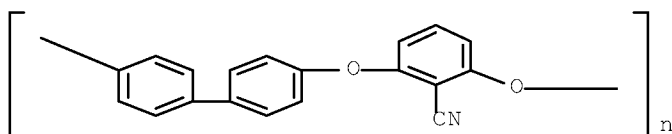
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CRN 92-88-6

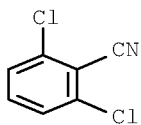
CMF C12 H10 O2



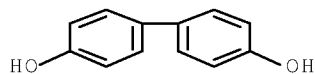
IT 94196-53-9DP, sulfonated 94196-69-7DP,  
 4,4'-Biphenol-2,6-dichlorobenzonitrile copolymer, sulfonated  
 681035-32-5P 681035-35-8P 681035-37-0P  
 (heat-resistant sulfo-containing polyethers for ion-conductive films)  
 RN 94196-53-9 HCAPLUS  
 CN Poly[oxy(2-cyano-1,3-phenylene)oxy[1,1'-biphenyl]-4,4'-diyl] (CA  
 INDEX NAME)



RN 94196-69-7 HCAPLUS  
 CN Benzonitrile, 2,6-dichloro-, polymer with [1,1'-biphenyl]-4,4'-diol  
 (CA INDEX NAME)  
 CM 1  
 CRN 1194-65-6  
 CMF C7 H3 Cl2 N



CM 2  
 CRN 92-88-6  
 CMF C12 H10 O2



RN 681035-32-5 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,

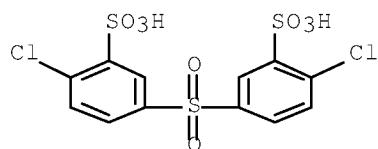
10/566,218

polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile and  
1,1'-sulfonylbis[4-chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

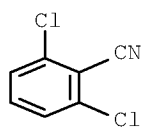


●2 Na

CM 2

CRN 1194-65-6

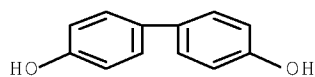
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



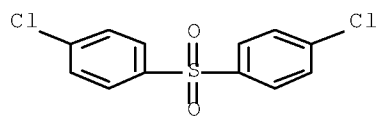
CM 4

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



10/566,218



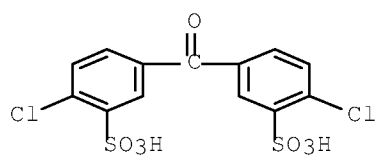
RN 681035-35-8 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (CA INDEX NAME)

CM 1

CRN 57004-46-3

CMF C13 H8 Cl2 O7 S2 . 2 Na

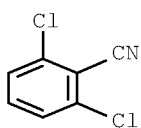


● 2 Na

CM 2

CRN 1194-65-6

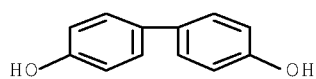
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



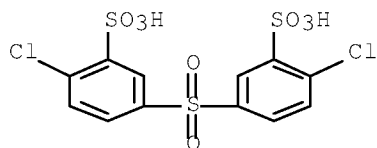
RN 681035-37-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
polymer with [1,1'-biphenyl]-4,4'-diol and 2,4-difluorobenzonitrile  
(9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

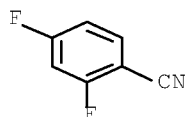


●2 Na

CM 2

CRN 3939-09-1

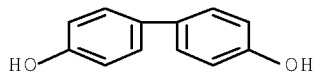
CMF C7 H3 F2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM C08G065-40

ICS C09J171-08; H01M008-02; H01M008-10

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 37, 52

IT 425636-38-0P, 2,5-Dicarboxybenzenesulfonic acid monosodium  
salt-3,3',4,4'-tetraaminodiphenylsulfone copolymer 426255-33-6P

681035-31-4P

(heat-resistant sulfo-containing polyethers for ion-conductive films)

IT 94196-53-9DP, sulfonated 94196-69-7DP,  
4,4'-Biphenol-2,6-dichlorobenzonitrile copolymer, sulfonated

681035-32-5P 681035-34-7DP, sulfonated

681035-35-8P 681035-36-9P 681035-37-0P

681144-72-9DP, sulfonated

(heat-resistant sulfo-containing polyethers for ion-conductive films)

OS.CITING REF COUNT: 6 THERE ARE 6 CAPLUS RECORDS THAT CITE THIS  
RECORD (11 CITINGS)

REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR  
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RE FORMAT

L41 ANSWER 14 OF 14 HCAPLUS COPYRIGHT 2009 ACS on STN

ACCESSION NUMBER: 2001:213476 HCAPLUS Full-text

DOCUMENT NUMBER: 135:5920

TITLE: Synthesis and Electrochemical and Optical  
Properties of Novel Poly(aryl ether)s with  
Isolated Carbazole and p-Quaterphenyl Chromophores

AUTHOR(S): Hwang, Shiao-Wen; Chen, Yun

CORPORATE SOURCE: Department of Chemical Engineering, National Cheng  
Kung University, Tainan, Taiwan

SOURCE: Macromolecules (2001), 34(9), 2981-2986

CODEN: MAMOBX; ISSN: 0024-9297

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

ED Entered STN: 26 Mar 2001

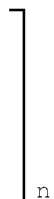
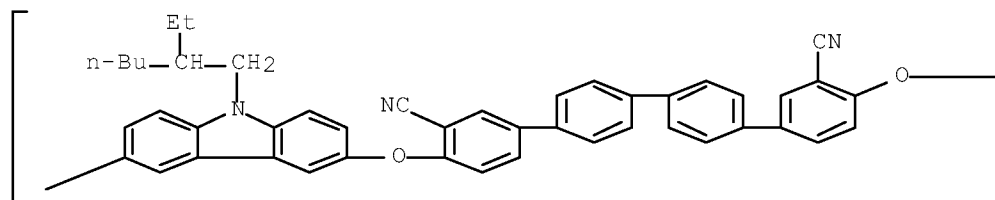
AB Two poly(aryl ether)s consisting of alternate isolated chromophores, poly[oxy-  
[9-(2-ethylhexyl)carbazole-3,6-oxy]-3,3'''-dicyano-p- quaterphenyl-4,4'''-  
ylene] (PCNCA) and poly[oxy-[9-(2-ethylhexyl)carbazole-3,6-oxy]-3,3'''-  
bis(trifluoromethyl)p-quaterphenyl-4,4'''-ylene] (PCFCA), were synthesized and  
characterized. The synthesized polymers are completely soluble in common  
organic solvents such as THF and chloroform. The two poly(aryl ether)s exhibit  
good thermal stability with 5% weight loss above 400° in nitrogen. The UV/vis  
and photoluminescent spectra of the polymers show maximum peaks at around 318-  
319 and 407-413 nm in the film state, resp. The HOMO and LUMO energy levels  
of these polymers, which were measured by cyclic voltammetry, are -5.23, -3.25  
eV for PCNCA and -5.41, -3.32 eV for PCFCA. The p-quaterphenyl segments are  
regarded as electron transporting units because the electron withdrawing  
substitutes (cyano and trifluoromethyl) enhance the electron affinity. The  
carbazole segments act as hole transporting units. The two units may lower  
the barrier of charge injection from opposite electrodes. Furthermore, all of  
the two units are emissive chromophores and contribute to the  
photoluminescence. The relative quantum yield of PCNA and PCFCA is 0.02, 0.40,  
resp., in film state, and 0.04, 0.19, resp., in THF.

IT 341036-60-0P

(preparation and redox potential and luminescence and band gap energy of  
poly(aryl ether)s with isolated carbazole and p-quaterphenyl  
chromophore segments)

RN 341036-60-0 HCAPLUS

CN Poly[[9-(2-ethylhexyl)-9H-carbazole-3,6-diyl]oxy(3,3'''-  
dicyano[1,1':4',1'':4'',1'''-quaterphenyl]-4,4'''-diyl)oxy] (9CI) (CA  
INDEX NAME)



CC 35-5 (Chemistry of Synthetic High Polymers)

Section cross-reference(s): 36, 72, 73

IT 341036-59-7P ~~341036-60-0P~~ 341036-61-1P 341036-62-2P

(preparation and redox potential and luminescence and band gap energy of poly(aryl ether)s with isolated carbazole and p-quaterphenyl chromophore segments)

OS.CITING REF COUNT: 39 THERE ARE 39 CAPLUS RECORDS THAT CITE THIS RECORD (39 CITINGS)

REFERENCE COUNT: 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

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OR 681035-31-4/BI OR 683774-17-6/BI OR 7440-06-4/BI OR  
7440-44-0/BI OR 839469-88-4/BI)

L3 STR

L4 STR

L5 STR

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L7 STR L4

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L18 458 SEA SPE=ON ABB=ON PLU=ON 1194-65-6/CRN

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L21 2367 SEA SPE=ON ABB=ON PLU=ON L13 AND PMS/CI

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L29 84 SEA SPE=ON ABB=ON PLU=ON L27 AND ELECTROLYT?

L30 43 SEA SPE=ON ABB=ON PLU=ON L27 AND ELECTROLYTE MEMBRAN?

L31 3 SEA SPE=ON ABB=ON PLU=ON L30 AND (1840-2003)/PRY,AY,PY

L32 10 SEA SPE=ON ABB=ON PLU=ON L27 AND (1840-2003)/PRY,AY,PY

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L33 27 SEA SPE=ON ABB=ON PLU=ON L9 AND SRU

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L34 257 SEA SPE=ON ABB=ON PLU=ON L33

L35 189 SEA SPE=ON ABB=ON PLU=ON L34 AND (1840-2003)/PRY,AY,PY

L36 5 SEA SPE=ON ABB=ON PLU=ON L35 AND ELECTROCHEM?/SC,SX

L37 14 SEA SPE=ON ABB=ON PLU=ON L31 OR L32 OR L36

L38 0 SEA SPE=ON ABB=ON PLU=ON L37 AND (WETABILIT? OR WET  
ABILIT?)

# 10/566,218

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